Countermeasures for Large-scale Sediment Disasters Caused by Successive Local Heavy Rains

Sabo Department

Increase in the frequency of sediment disaster by local heavy rain and damage intensification have been remarkable, such as the July 2017 Northern Kyushu Heavy Rain and the July 2018 Heavy Rain. Then, we study forecast techniques and countermeasure technologies for frequent large-scale sediment disasters.

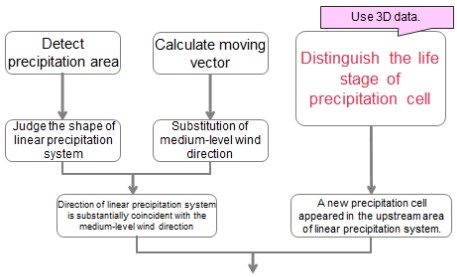
Social background and issues

- Frequent occurrence of large-scale sediment disaster from local heavy rain caused by linear precipitation system
- Damage of sediment disasters is intensifying, such as outflow / accumulation of sediment / driftwood in wide downstream area causing flood as well as damage from debris flow and collapse in upstream area.
- It is urgently required to establish a method of predicting linear precipitation systems, a method of predicting accurately sediment runoff according to the grain size of produced sediment and scope of water / sediment flood, and an effective and efficient sabo facility arrangement planning method based on the foregoing methods.

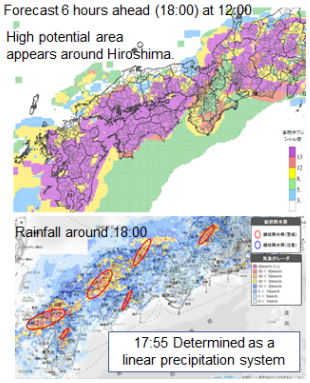
Study contents

Study on forecast of the linear precipitation systems that cause sediment disasters.

Development of a system for automatically detecting linear precipitation systems based on the indicators of atmospheric instability, amount of water vapor, possibility of causing an ascending current, etc. as well as 3D observation values of X-band MP radar, using numerical weather forecast of the Meteorological Agency. As a result of applying to the heavy rains that caused major sediment disasters in recent years, it was demonstrated that appearance of a linear precipitation system can be forecast about 2 to 6 hours before.



Method of detecting linear precipitation systems with 3D observation data.



Example of detection from the July 2018 Heavy Rain

Study on forecast of sediment disaster damage and effective countermeasure facility planning.

Improve the river-bed variation calculation based on the behaviors of fine sediment that vary according to gradients, such as sediment being caught between the gravels of debris flow, forming bed / suspended load in low-gradient sections. Verify the reproducibility to previous disasters and confirm application to damage prediction for sediment floods that cause damage in wide downstream area. Further, points of attention in calculation and application to the sabo facility arrangement plan were summarized as Technical Note of NILIM.

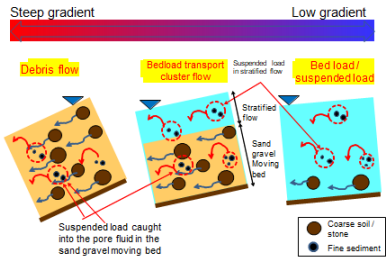
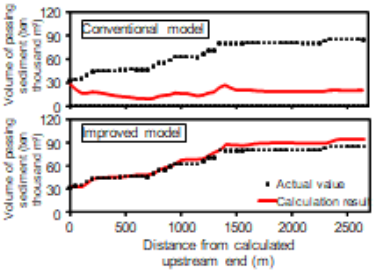


Image of modeling considering the variation of sediment movement patterns from debris flow to bed load / suspended load.



Numerical simulation of the sediment runoff in the July 2016 Northern Kyushu Heavy Rain (Left: Upstream, Right: Downstream)

Effective sabo facility arrangement plan is possible based on the method of predicting occurrence and damage of sediment disaster by local heavy rain and relevant numerical calculation.

☞ Related articles.

- A Study on Automatic Detection of Linear Precipitation Systems etc. for Sediment Disaster Warning and Evacuation
- Issuance of the Guide (draft) to Study on Sabo (erosion control) Facility Arrangement as Countermeasure for Sediment Flooding / Inundation using River-bed Variation Calculation